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COLONY OF MAURITIUS

Annual Report of the Department of Agriculture for 1939

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Annual Report of the Department of Agriculture for the Year 1939.

PART I

GENERAL REPORT ON THE AGRICULTURAL CONDITIONS OF THE COLONY AND THE WORK OF THE DEPARTMENT OF AGRICULTURE FOR THE YEAR 1939.

1. Meteorological Conditions

Weather conditions during the year have been greatly disturbed. The growing season began with a drought which lasted till the middle of February; good rains were then received, the effects of which were however offset by the occurrence on 19th—21st March of a cyclone which inflicted pronounced damage on the standing crop. Winter conditions were not favourable to cane maturation owing to abnormal heat and moisture and, finally, on 16th December another cyclone visited the Island without, however, causing serious damage except to fruit.

2. Sugar Production

The total cane reaped approximated 2,100 thousand metric tons, in defect by 590 thousand metric tons or 22 per cent. on the previous year and by 26 per cent. on 1938 the year of record cane production.

The average sucrose content for the whole Island was only 12·71 as against 13·87 in 1938, and the average extraction 10·8 of sugar per cent. of cane as against 11·95 last year.

The Colony's production of commercial sugar was 229·46 thousand metric tons, in defect by 29 per cent. on 1938.

3. Grades of Sugar

The proportion of raws in the total production was this year 85·5 per cent.; granulated whites, 14·3 per cent.; and low sugars 0·2 per cent.

4. Area under Sugar Cane

At the beginning of 1939, the area under sugar cane was estimated at 146,381 acres, in excess by 1,285 acres on the figure for 1938.

Estate cultivation amounted in total to 103,051 acres, in excess by 785 acres on the corresponding figure for the year previous.

The balance of 43,330 acres consisted almost entirely in lands owned and worked by Indian small proprietors. The total area under cane cultivation by Indians at the beginning of 1939 amounted to 55,823 acres or 38 per cent. of the total cane cultivation of the Island.

5 and 6. Sugar Market and Disposal of the Sugar Crop

In 1939 market conditions were better than during the year previous. The average selling price approximated Rs. 6·80 per 50 kilos. The total exported during the 1938–39 year (1st August, 1938, to 31st July, 1939), amounted to 308,909 metric tons, of which 306,297 went to Great Britain and 2,341 to Hong Kong. The local sugar consumption for the year 1938–39 was 12,197 metric tons.

7. Labour and Cost of Living

During the year a Central Control Board was organised for the settlement of questions relative to the purchase of canes and the delimitation of factory areas.

In 1939 the cost of living for labouring classes remained for the first nine months practically constant at the 1914 level. When war broke out a rise in nearly all items was in evidence and the total cost of living rose by about 10 per cent.

8 and 9. Sugar Machinery and Fertilizers

Machinery to the value of Rs. 761,424 was imported during the year and tramway material to the value of Rs. 138,260. Farm tractors and ploughs valued altogether at Rs. 48,650 were also imported.

A total of 16,794,905 kilos of chemical fertilizers valued at Rs. 2,216,818 was imported in 1939 ; of this total 67 per cent. consisted in sulphate of ammonia and 24 per cent. in saltpetre.

10 and 11. Insect Pests and Plant Diseases

The visit of the Scientific Assistant of the Entomological Division to Ceylon in search of cane borer parasites was not unproductive and the work of the Assistant Entomologist in Northern Africa has given beneficial results. A further promising line of work has been the investigation of possible Phytalus parasites in Cape Colony and Natal.

The tobacco weevil (*Lasioderma serricorne* L.) has now been put under some measure of control, and the control of Phytalus amongst small planters' cane has received increased attention.

The customary surveillance of standard cane diseases such as gummosis, leaf scald, smut and red rot has been maintained; some valuable observations and trials have been effected.

12. Tobacco

During the year under review 285,000 kilos of tobacco were produced consisting of :

Flue cured	197,000
Air cured	88,000
Total	285,000

Of this quantity 15,000 kilos were received from Rodrigues.

13—16. Fibre, Pineapple, Tea, Coconut

During the second half of the year there were faint signs of revival of the fibre industry. The total exportation in 1939 was 321 metric tons.

Conditions during the year were not generally favourable to the pineapple industry and the production was only 3,315 cases. The exportation in 1939 was valued at Rs. 28,175.

Considerable improvement is being effected in the Bois Chéri tea factory. The production for 1938–39 was 43,200 kilos. At Curepipe tea garden the production for 1939 was 26,000 kilos.

In 1939, the export of copra was 1,647 metric tons valued at Rs. 193,139. There was hardly any export of coconut oil.

17. Alcohol

The total quantity of alcohol distilled for human consumption amounted to 609,890 litres and the quantity distilled for industrial purposes to 1,141,370 litres. The exportation of rum in 1939 was 224,234 litres valued at Rs. 79,264.

18. Veterinary and Livestock

Surra has not been so prevalent as previously. The intensified campaign against tuberculosis has been made possible by this decline of surra and has yielded same valuable results. The whole question of the control of tuberculosis amongst the bovines of the Island is being thoroughly overhauled. The position with regard to the improvement of pastures is not entirely satisfactory as the advent of war has raised the cost of fertilizers and labour. This aspect of the question is receiving attention. At the beginning of 1939 the total bovines on estates numbered 13,021; the total number of sheep, 1,870, and goats 3,972.

Importation of bullocks from Madagascar for food purposes, amounted to 2,541 heads valued at Rs. 183,515. Importation of cows and oxen from Rodrigues numbered 320 valued at Rs. 18,720; goats numbered 2,621 valued at Rs 17,850; pigs 1,397 valued at Rs. 24,625; and sheep 508 valued at Rs. 3,897. The number of fowls imported was 2,868 valued at Rs. 1,464.

19. General

I wish to record my deep appreciation of the measure of assistance which I have unhesitatingly been accorded by the staff of the Department during the year.

The work of the Sugarcane Research Station and the various Divisions has, as usual, been conducted in an atmosphere of close co-operation with the planting community of the Island. To the very large number of cultivators—members of all classes of the community—who have afforded opportunities for special investigation I take this opportunity of presenting the gratitude of this Department.

G. E. BODKIN,
Director of Agriculture.

PART II

Report on the Sugarcane Research Station and Divisional Reports of the Department of Agriculture

Sugarcane Research Station

A full report of the activities of the Sugarcane Research Station during 1939 is published separately.

Agricultural Division

1. Central Experiment Station, Reduit

The propagation of new varieties of sugarcane selected by the Sugarcane Research Station continued as in the past. During the year 101,904 cuttings of sugarcane were sold for Rs. 2,038.08, while 2,550 cuttings were distributed free to small planters. At the outbreak of the Second Great War, extensive plantations of manioc, maize and sweet potatoes were made for the purpose of supplying planting material to the public. Another field of smooth cayenne pineapple was also laid down and a further plot of newly opened upland was prepared for cultivation.

Plant Exchange

Plants and Seeds were received from :

Mr. P. Regnard, Madagascar.
Mr. Scott, Southern Rhodesia.
The Curator of the Royal Botanical Gardens, Peradeniya.
The Director, Royal Botanical Gardens, Kew.
The Director of Agriculture, Fiji.
The Director of the Pan-American Society of Tropical Research, New Orleans.

Plants and seeds were sent to :

Mr. O. Tessier, Botanical Gardens, Canada.
Mr. K. S. Cheng, Kwangsi University, China.
The Adviser on Agriculture, Malay States.
The Curator, Royal Botanical Gardens, Kew.
The Director of Agriculture, Jamaica.
The Director of Agriculture, Fiji.
The Director of Agriculture, Morogoro, Tanganyika Territory.

2. Barkly Experiment Station, Beau Bassin

A large number of economic plants were raised for sale to the public and for distribution to school gardens, allotments and various Government institutions. The revenue from this source amounted to Rs. 1,164.60. Food crop plantations were extended as soon as war was declared in Europe.

3. Royal Botanical Gardens, Pamplemousses

Economics Section.—The same canes already selected for multiplication at the Central Experiment Station were also propagated at Pamplemousses. 34,747 cuttings of the varieties M.171/30, M.72/31, M.73/31, and M.134/32 were sold for Rs. 694.94.

Practically the whole of the available land was put down to manioc, sweet potatoes and pea-nuts as soon as war broke out.

Ornamental Section.—The new palm avenues have now grown sufficiently to add an appreciable quota to the beauty of the site.

4. Abercrombie Nursery

The following plants were sold to the public during the year: 141 litchi layers, 217 mango grafts, 236 citrus grafts and seedlings, and 1,702 ornamental and other plants.

5. Food Settlements: St. Martin, La Ferme, and St. Thomas

There are now 73 members of the St. Martin Co-Operative Credit Societies on these settlements. During the year four undesirable tenants were evicted: they were immediately replaced by others.

6. School Gardens

There are now 31 registered school gardens, one garden being closed during the year. The schools were inspected, and gardening classes held at regular intervals by Agricultural Officers, who paid 450 visits during the year.

Prizes for the best gardens were awarded as follows:

1st	prize of Rs. 40	to Ruisseau Rose Government School.
2nd	,, 30	to Mahebourg Government School.
3rd	,, 25	to Old Grand Port R.C. Aided School.
4th	,, 20	to Plaines des Papayes Government School.

7. Visits to Estates and Planters

This essential feature of the Agricultural Division's activities was maintained. The Senior Agricultural Officer paid 151 visits to sugar estates, tea growers and other planters. The Agronomist visited estates and all the pineapple planters as often as possible. Agricultural Instructors paid 1,040 visits to small planters during the year. 224 small planters were also visited by them.

This Division continued to assist the Botanical Division twice a week in connection with the plant inspection service at the Customs.

8. Allotments

There are now 131 allottees distributed as follows:

Barkly	49	Malherbe	18
Bois Marchand	32	Curepipe	7
Richelieu	25		
		Total	131

The allottees suffered from malaria particularly at Barkly and Richelieu and free issues of quinine were made. They were also greatly affected by the recent measles epidemic.

The Allotments Sub-Committee held 21 meetings during the year. Seven allottees were evicted and replaced by others on the waiting list.

9. Export of Litchis

Messrs. Merven & Co. exported 2,000 cases of litchi on 2nd January. A small consignment of 134 cases was sent to Durban by Messrs. Moreea Brothers. The fruit reached London in somewhat mouldy condition. Owing to the December cyclone no other fruit could be exported. Moreover Messrs. Pearmain & Co., who had been the principal exporters in the past, were informed from London that the luxury trade was dead as a result of the War and Covent Garden merchants refused to give any undertaking with regard to rapid disposal of consignments.

10. Pineapple Demonstration Stations

Two of the three Demonstration Stations created early in 1937 were closed during the year. These stations were situated at Mon Rocher and at Britannia. The yield of fruit per acre averaged 5 tons at Mon Rocher and just over 3 tons at Britannia. These yields would undoubtedly have been higher if the plantations had not suffered from attacks of mealy bugs and from very dry conditions at the time when fruit was forming.

Conditions at Trianon, the third of these stations, were appreciably better, the yield per acre averaging about 9 tons. Work at this station is still in progress.

11. Rice

The weather conditions prevailing throughout almost the whole duration of the experiments with rice were amongst the worse on record. As a result, of 28 acres actually planted in various parts of the colony only 9·8 acres came to fruition.

At Yemen, where the rice was cultivated on heavy soil under irrigation the crop was good, the following yields of paddy per acre being obtained: Patna 1,785 kilos, Bangtulsie 2,208 kilos, Milchar 2,200 kilos. Under these conditions the cost of production per kilo of paddy was 15 cents. Under non-irrigated conditions, the best yield averaged 600 kilos of paddy per acre and the cost of production was much higher.

C. A. O'CONNOR,
Senior Agricultural Officer.

CO-OPERATIVE CREDIT SOCIETIES DIVISION

The outstanding feature of the year's work lies in the satisfactory development of the movement, necessitating an increase of the permanent personnel of the division. Thus two Junior Inspectors have been appointed, one for Mauritius and one for Rodrigues.

The members of the Societies continued to increase their shareholdings. Advances from State Funds totalling Rs. 6,500 were made to two Societies. On the other hand, all the Societies holding Government advances punctually repaid the instalments with interest due by them. The aggregate amount of the advances due to Government as on the 31st December was Rs. 19,240.

Loans were issued to the members throughout the year according to their seasonal needs after a careful scrutiny of their applications by the Committee in the presence of an Inspecting Officer. Despite the adverse climatic conditions experienced and the economic depression still prevailing during the year under review, the standard of recovery was well maintained.

The powers of the Registrar requiring a Society to dismiss unfit members were, for the first time, used in two cases during the year.

Continuous, intensive work, talks and advertisements through leaflets and bulletins are clearly producing definite results. Small agriculturists who were frightened of the Unlimited Liability are now voluntarily assuming their serious liability and have at last been convinced that through the Co-Operative Credit Societies lies a real improvement of their economic, social and moral conditions.

The desire to co-operate has been especially noticeable in the districts of Flacq and Grand Port. Although opposition is still marked on the part of those whose personal interests are affected by the Co-Operative Credit Societies, the need for rural co-operation in the form of Credit Societies is accepted by a large number of the agriculturists resulting in an exceptionally large demand for the registration of new Societies during the year under review. But, in order to enable the present inspecting staff adequately to supervise the working of these institutions, only part of the applications received could be attended to. Thus 8 new Societies were registered as against two the previous year. The number of Societies in active operation on the 31st December was 45 as compared with 37 last year.

The question of granting to small planters long term loans of less than Rs. 5,000 with mortgage security by the Mauritius Agricultural Bank is still under consideration.

The work of the Co-operative Credit Societies forms the subject of a special report issued in September. The details of the working thereof for the financial year ended 30th June, 1939, are shown in the annexures to such report.

M. BURRENCHOBAY,
Assistant Registrar.

DIVISION OF PLANT PATHOLOGY

1. Diseases of the Sugarcane

GUMMOSIS (*Bacterium vasculorum* (COBB) G. SM.)

(*a*) New varieties produced by the Sugarcane Research Station were tested for their resistance to gumming disease, on trials which are now laid out in collaboration with the Geneticist.

(*b*) *Artificial hosts.*—Positive results were obtained when a suspension of *B. vasculorum* was inoculated into the spindles of young coconut palms.

2. Leaf Scald (*Bacterium albilineans* ASHBY)

(*a*) *Incidence.*—The first record of leaf scald on SC 12/14 was made at Mon Désert Sugar Estate, Moka. In January a field of virgin canes was severely attacked by this disease which was again met with on the same variety at Gros Bois Sugar Estate, Savanne, in July.

(*b*) *Resistance Plot.*—Observations were continued on the experiments mentioned in last year's report with inconclusive results.

(*c*) *Artificial Hosts.*—Researches on the artificial hosts of *B. albilineans* were carried out by the Assistant Plant Pathologist, who found that the following grasses readily contract the disease when inoculated into the spindle: *Zea mays* L., *Coix lachryma Jobi* L., *Thysanolæna maxima* O. Kuntze, *Cymbopogon citratus* Stapf. These experiments are being continued to include other Gramineæ and it is hoped to publish the results obtained during the course of next year.

SMUT (*Ustilago scitaminæ* (RAB.) SYD.)

(*a*) *Incidence.*—The dry season prevailing during the earlier months of the year greatly favoured the intensity of smut in lowland localities, particularly in the North and at Grand Port. BH.10/12 was the variety most severely affected. Ratoon canes suffered more than virgins and in some cases a large number of stools died from the disease. It was also found that M.171/30 is susceptible to smut in these localities.

(*b*) *Experimental.*—The root system of canes growing in water cultures (BH.10/12) were inoculated with smut spores. No diseased shoots were produced after a period of eight months, when the canes died. On the other hand root inoculation of the fungus in the field gave interesting results in a trial at Pamplemousses Experimental Station. Three months old virgins of the following varieties DK.74, BH.10/12, White Tanna, were inoculated in January. The roots were damaged with a knife and smutted heads disintegrated and mixed with the soil at various points around the stools. Fourteen stools of each of the three varieties were thus treated, an equal number of holes remaining as controls. Counts of smutted shoots were made at monthly intervals and thereafter removed while the position of infected stools were noted.

The results obtained showed that the method of inoculation is satisfactory, 73 per cent. of the inoculated stools having contracted the disease while the controls remained healthy.

Another trial was laid out at Labourdonnais Sugar Estate in November, 1938, to study the effect of the mode of application of farmyard manure on the incidence of smut. A field of virgin BH.10/12 was divided into six plots of one acre, three of which were manured in the interlines and the other three on the stool, after "dévidage" in December. Counts of smutted stools were made before manuring, and again in October a few days before the canes were reaped. The counts were based on six random blocks of 25 stools in each plot. There was no infection in December, 1938, while it was found in October 1939, that the plots which had been manured in the interlines showed an average infection of ~~36~~ per cent. against an infection of ~~12~~ per cent. in the plots which were manured in the stools. A statistical analysis of these results showed that the difference between the two treatments was fully significant.

Red Rot (*Colletotrichum falcatum* Went).

(*a*) *Incidence.*—Towards the end of the year an outbreak of red rot was studied on virgin M.134/32 at California Sugar Estate, Pamplemousses. The affected field was heavily infected by the spotted borer and in all the cases examined the fungus had gained entry through the borer galleries. An analysis of stools showed that 75 per cent. of the shoots were attacked by borers, of which 35 per cent. showed typical red rot lesions, 18 per cent. of the shoots having died from red rot.

Eye Spot (*Helminthosporium ocellum* Faris).

The effect of potassic fertilisers on the intensity of eye spot infection was studied on the susceptible BH.10/12 at Deux Bras Sugar Estate and Rose Belle Sugar Estate, Grand Port. In the first trial the treated plots received 60 kilogs nitrate of potash in addition to the normal dose of fertilisers while the control plots were manured with an equivalent quantity of nitrate of soda. The plots were replicated three times and the percentage infection of the third leaf was determined by estimating the spotted area occurring in a quadrat 1 × 1 cm.; five quadrats were taken on each leaf and twenty leaves examined in each plot. Observations were made at intervals of two months. The results obtained were inconclusive, 9·1 per cent. of the third leaf being infected in the treated plot and 9·7 per cent. in the controls.

At Rose Belle Sugar Estate the plots were replicated six times, control plots receiving an application of complete fertilizers, and potash being omitted from the mixture applied to the "treated" plots. Helminthosporium infection was determined as in the previous case, again with inconclusive results.

Root Disease.

An intensive study of growth failure on P.O.J.2878 revealed that affected areas include parts of the districts of Grand Port, Savanne,

Flacq and Moka. The cause of growth failure was traced to the premature decay of the root system brought about by the combined action of *Angiullulina similis* Cobb. and weak parasites including *Fusarium* spp., *Rhizoctonia* spp., *Pythium* spp. In addition *Pythium arrhenomanes* Dresch. was isolated from diseased roots and attacks of the root system by the gall forming nematode *Heterodera marioni* (Cornu) Goodey were of frequent occurrence. A comparative study of root disease on P.O.J.2878 and D.130 (a variety which disappeared from cultivation because of its susceptibility to root disease) revealed that in both cases destruction of the root system is brought about by the same factors.

Chlorotic Streak.

A suspected attack of chlorotic streak (Fourth disease) on virgin B.H.10/12 was studied at Mon Désert and Mon Trésor Sugar Estate, (Grand Port,) in October. A trial was subsequently laid out at the Central Experiment Station to study the effect of hot water treatment on infected cuttings.

2. Diseases of Tobacco

The annual survey of the incidence of tobacco diseases revealed that the three major diseases were far less prevalent during the year. There was a marked decrease in the number of infected plantations as well as the degree of infection. Black Shank and Mosaic occurred in most districts of the island, while Granville Wilt was restricted to the Districts of Flacq, Pamplemousses and Rivière du Rempart. The percentage of nurseries infected with damping off was 19 per cent. in 1939 compared with 52 per cent. in 1938. This decrease in infection is probably due to the cold and dry weather prevailing in April, May and June as compared with last year.

The following weeds showing typical mosaic symptoms were collected in the vicinity of tobacco fields: *Accacia concinna* Dc. ("chicakaye"), *Desmanthus virgatus* Willd. ("Petit cassia"), *Leonorus sibiricus* L. ("Armoise"), *Ipomea obscura* Ker., *Psophocarpus tetragonolobus* DC. ("Pois carré"), *Thunbergia fragrans* Roxb. In addition *Mucuna deeringiana* (Bort) Holl. (Pois Mascat) which is frequently used for green manuring was found to be attacked by mosaic in a field which was under tobacco the previous year. Experiments conducted in an insect proof green house showed that mosaic of *Mucuna* and mosaic of *Leonorus* were transmissible to tobacco, the latter causing enations and acute distortion of the leaves. A short article on Mucana Mosaic was published in the *Revue Agricole* ("Un nouvel hote du tabac à Maurice" *Revue Agricole*, No. 106, 1939.)

3. Diseases of "Tatamaka" (*Calophyllum Inophyllum* Linn.)

Wilt. *(Haplographium* sp.)

The causal organism of wilt of Calophyllum has been identified by the Imperial Mycological Institute as *Haplographium* sp. (sp. nov.). Healthy trees were inoculated in a pole forest at Plaine Sophie. The first signs of wilting were apparent six weeks after inoculation and a

fortnight later all the trees were dead. The organism was re-isolated from portions of affected wood. Examinations of dead trees showed that the whole of the sap wood was completely permeated by fungal hyphæ.

The host range of the fungus was studied by inoculation into a selection of indigenous forest species including : *Eugenia glomerata* Lam. (Bois pomme,) *E. cotinifolia* Jacq. (bois clou), *Mimusops maxima* (Poir.) Dubard (Bois de natte), *Mimusops petiolaris* Dubard (Macaque), *Labourdonnaisia callophylloides* Bojer. (Bois de natte Legentil), *Conopharingia Mauritiania* (Poir) R.E.V. (Bois de lait), *Erythroxylon laurifolium* Lam. (Bois de ronde), *Gærtnera psychotrioides* Baker (Bois Banane). Positive results were only obtained on *Mimusops maxima* and *Eugenia glomerata*. The progress of the disease on these two species is slow however and the lesions produced six months after inoculation only covered an area of about 2 square inches.

The rate of spread of the disease is being studied in two permanent quadrats laid down at Plaine Sophie, while at Plaine Champagne control of the disease is attempted, in collaboration with the Forestry Department, by removing all dead and dying trees as well as exotic shrubs from certain areas.

STEM ROT *(Geotrichum candidum* LINK*)*

Stem rot of Calophyllum is less prevalent than wilt and has so far been only encountered at Crown Land Bel Ombre.

The causal organism has been identified as *Geotrichum candidum* Link, its pathogenicity was proved by inoculations into healthy trees and subsequent re-isolations.

4. Diseases of Citrus Trees

The cause of citrus mottle leaf in the island is still obscure. Diseased trees were treated in the following way :

(a) Sprayed with zinc sulphate and lime.

(b) Application of zinc sulphate to the soil.

(c) Injections of different concentrations of zinc sulphate in the stem.

(d) Injection of minute doses of iron, magnesium, boron, copper, zinc, urea, potassium phosphate and potassium nitrate in the leaves.

No significant results were obtained and further experiments are in progress.

5. Wilt of " Herbe Tourterelle " (*Wickstrœmia indica* MERR.)

Wilting plants of " Herbe tourterelle " were collected at Palmar (Flacq) in August. *Phytophtora parasitica* Dast. was isolated from diseased tissues and its pathogenicity proved. Plants dying from the same cause were later collected in different localities (Pierrefonds, Plaine Champagne, Floréal, Réduit). A study of the disease revealed that the fungus gains entry through wounds and rapidly invades the phloem and sap wood. The organism progressing downwards from the seat of infection. Under favourable conditions, wilting begins from four to

six weeks after primary infection. The relation of *Wickstroemia* isolates to tobacco plants is being studied.

6. Collections

The Herbarium of the division was reclassified and indexed during the year. It is now divided into three parts consisting of *(a)* Flowering plants, *(b)* Specimens of plants diseases, *(c)* Fungi—a collection of type cultures of pathogenic fungi and bacteria occurring in the Island was also started. Specimens of 69 diseases not yet recorded in the Island were collected during the year.

7. Visit to the Changos Archipelago

The undersigned visited the Changos Archipelago during the month of June and submitted a report on his visit. Amongst the various problems studied were the local methods of coconut cultivation, including the occurrence of pests and diseases and the possibilities of grassland development.

8. General

The Scientific Assistant, Mr. G. Orian, was appointed Assistant Plant Pathologist on the 1st July. He was absent on sick leave from the 25th May until the 3rd August.

The plant Inspector, Mr. J. Duhamel, was in charge of the division from the 20th May until the 20th June.

The valuable assistance received from the Imperial Mycological Institute on the identification of specimens is gratefully acknowledged

P. O. WIEHE,
Plant Pathologist.

SUGAR TECHNOLOGICAL DIVISION

1. Visits to Fatories, Investigations, etc.

The thirty-six factories in which sugar was produced during the crop, were visited by the Sugar Technologist and investigations carried out.

2. Clarification of Cane Juice

(a) A complex process of clarification was applied in a factory in the northern part of the Island. A Bach continuous juice subsider formed part of the necessary installation. The quality of the juice treated was particularly poor this year, due to a very dry season followed by late rains. The advantages derived were the following: the factory crushed at full capacity in spite of the refractory nature of the juice (with similar juice in 1934, the rate of crushing had to be reduced by 25 per cent.); the loss of sucrose in the filter press cake was reduced by about 50 per cent.; the juice from the Bach subsider was so clear that filtration through Philippe filters was no more necessary; scaling in the evaporators was considerably reduced; an increase of 2 units in the sucrose recovery. The clearness of the juice from the Bach subsider was not affected by fluctuations in the pH. With variations ranging

between pH 6·4 and 8·5, the clearness was as satisfactory. There was an increase of one unit in the purity of the juice during the passage through the subsider.

(*b*) The fractional liming and double heating process of clarification was applied in another factory, where the juice was also refractory. The results although satisfactory, were not as striking as those obtained with the complex method mentioned above.

3. Determination of Hydrogen Ion Concentration

Comparisons were made in factories between the electrometric determination of pH with the aid of Beckman pH meter (glass electrodes) and the colorimetric method using the Hellige apparatus.

The conclusions arrived at are that when using Hellige micro-cells (undiluted juice and syrup) there is perfect agreement between the colorimetric and electrometric readings. With the micro-cells (dilutions of 1 in 5 for the juice and 1 in 10 for the syrup) the colorimetric readings are usually too high by 0·3 to 0·5. This difference is attributable to the change due to dilution and not to the method itself.

4. Controle Mutuel and Factory Results

Twenty-eight factories contributed to the fortnightly returns which were distributed amongst contributors.

All the factories forwarded their final figures. The results show an average sucrose content of 12·71 per cent. cane, as compared with 13·87 and 12·99 in 1938 and 1937 respectively. This is the lowest figure on record for the last thirteen years. The quality of the juice was poor all over the Island, particularly so in the Eastern, Northern and Western Districts, where manufacture was difficult. Recovery was 1·5 lower than in 1938, on an 85 per cent. purity basis.

5. General

The Departmental Committee appointed to investigate the possibility of purchasing planters' canes by factories on a qualitative basis, concluded its investigation. The Sugar Technologist who acted as Chairman forwarded the report of the Committee to the Director of Agriculture.

The Assistant Sugar Technologist left for Europe on leave on the 3rd April. On his return to the colony on 12th December, he was seconded for duty as Registrar of the Central Board appointed under Ordinance No. 27 of 1939.

6. Educational

The usual duties in relation to teaching at the Mauritius Agricultural College were performed by the Sugar Technologist and by his assistant. During the leave of absence of the Assistant Sugar Technologist and since his return, the lectures in Engineering and Surveying were delivered by Mr. F. North Coombes, Sugar Technologist at St. Aubin Sugar Estate.

LOUIS BAISSAC,
Sugar Technologist.

ENTOMOLOGICAL DIVISION

1. Pests of Sugarcane

Phytalus Smithi ARROW

The general policy adopted during the year to control this pest can be summarised as follows :

(*a*) Searches in various foreign countries for parasites of white grubs and their subsequent collection and shipment to Mauritius.

(*b*) Reception and laboratory breeding of the parasites imported and their liberation in the heavily infested centres.

(*c*) Regular distribution of newly imported parasites which have been recovered and acclimatized in the Island.

(*d*) Meetings of small planters and propaganda for the planting of Phytalus resistant varieties.

(*e*) Distribution on a small scale of cane tops of promising resistant varieties to small planters together with a large supply of plant food cuttings for parasites.

With regard to the foreign parasite work, the searches were centered mainly on *tachinids* known as parasites of larvæ and of adult beetles. During the year seven shipments of *Pexopsis pyrrhaspis* Villen. were received from Natal. Ten shipments of *Deviomarpha picta* Meig. were received from Morocco. The dexiid, *Microphthalma capensis*. Schin., was also received in large numbers from South Africa. The number of pupæ obtained per larva varies from 1 to 5, with a mean of two per larva. Laboratory breeding of this species on Phytalus has been successfully carried out. Two shipments of the Ortalid fly, *Adapsilia latipennis* Wlk., were also received from South Africa. Out of a total of 2,462 pupæ sent, only six flies emerged. The change of climatic conditions is obviously a cause for this failure. Better results are expected with the use of the newly acquired electric refrigerator, and shipments in the cool chamber on board during transit.

The European dexiid, *Dexia rustica F.*, was received from Farnham Royal ; four consignments were sent during the year.

The cyclone of March, 1939, had a very disastrous effect on the Scoliids in the Island, most of the established species were extremely rare on account of the bad weather. This state of affairs reduced considerably the regular distribution of parasites to all planters concerned. Ten colonies of 200 females *Campsomeris phalerata* each were liberated mainly in small planters lands. A Madagascar hyperparasite of *C. pilosella* has been found, but its status is thought to be unimportant.

As previously mentioned a distribution of some Phytalus resistant cane varieties was done to small planters in the southern part of the Island. Eleven tons of M.27/16, three tons of 72/31 and 150 canes of 134/32 were given to small planters as a trial experiment in their infested fields.

The giant toad *Bufo marinus* L. was systematically distributed during the year. A permanent stock is being kept for breeding at the Barkly Experiment Station Pond, Beau Bassin.

No trace of establishment of any of the Tachinid parasites imported has been found. Over 100,000 adult Phytalus beetles were dissected with a view to recovering the Malgache fly, *Paratamiclea pallida var hova* Villen., and the Natal parasite *Peaopsis pyrrhaspis* Villen.

It is the policy of the Division to maintain the closest co-operation with the Sugarcane Research Station in matters affecting the relation of Phytalus to the new varieties produced by the Station. For a number of years attempts have been made to assess the " Phytalus resistance " of different varieties. Replicate plot experiments have been laid down, and the correlation between crop and Phytalus larval surveys determined. It is, however, the opinion of the writer that significant statistical correlation, unless it recurs consistently, does not provide an answer to the question at issue, and that little reliance can be placed in the results of replicate plot experiments, unless the measurable quantities be simple physical phenomena and not the resultant of the action of a complex of factors.

Moth Borers

The routine survey on the same lines as in the preceding year was carried out on the varieties B.H.10/12 and White Tanna. 9,000 canes were examined at random on 24 estates with the following results :

Variety	*Mean stalk infestation*			*Mean joint infestation*		
B.H.10/12 ...	14·0	23·3	25.11 ...	10·4	8·7	9·6
White Tanna ...	11·9	20·2	24.1 ...	9·2	8·1	9·5
Year ...	1939	1938	1937 ...	1939	1938	1937

The preliminary survey undertaken by the Scientific Assistant, J. Vinson, in Ceylon led to the following results :

In Ceylon *Diatræa* larvæ were found extremely rare in cane-fields ; during the six months spent in this country only 11 *Diatræa* larvæ were obtained in an area of about 150 acres of cane. The moth borer of common occurrence in stems of cultivated and wild grasses in Ceylon is *Chilo zonellus* Swinh. This genus is closely related to *Diatræa*. Searches were therefore centered on this moth borer and its parasites with the following results :

Larval parasites : *Bracon albolineatus* Cam.
Apanteles flavipes Cam.
Macrocentrus sp.
Pupal parasite : *Xanthopimpla stemmator* Thunb.

The braconid, *Bracon albolineatus* Cam., was one of the most promising parasites. Laboratory breeding of this parasite on *Diatræa* and *Sesamia* larvæ was successfully carried out with the result that 2,528 parasites were liberated in twelve infested cane fields during the period of April to December.

A small colony of the pupal parasite *Xanthopimpla stemmator* Thunb., was also received. This parasite has been recovered in one place in the Island. A colony of the egg parasite, *Trichogramma evanescens* Westw. (= *minutum* Riley) was obtained by Mr. Vinson from the Tea Research Institute in Ceylon. Breeding was continued on eggs of *Ephestia* sp. and other moths, as a result of which 30,000 were liberated in cane fields infested with *Diatræa*.

The Eulophid wasp, *Trichospilus pupivora* Ferr., a parasite of many lepidopterous pupæ was also imported from Ceylon. It was found from laboratory breeding that this parasite attacks *Sesamia* pupæ. Over 100,000 insects have already been liberated in various cane fields, tobacco plantations and on various lawns. The life cycle of this parasite is of 18 days in summer and 31 days in winter.

The project of parasite borer investigation in the East had to be deferred in view of the outbreak of war, but a preliminary survey of Nossibé Island and the adjacent mainlands of Madagascar has been sanctioned for March, 1940. This area possesses a rich Ichneumonid fauna and *Diatræa venosata* is known to occur in the cane districts.

Replicate plot experiments to determine borer resistance of new varieties were carried out in co-operation with the Sugar Research Station and yielded much interesting data.

Root Disease.

Root disease was reported during the year in some cane fields on the southern and eastern parts of the Island. The variety P.O.J.2878 was found to be very susceptible. A primary cause of the disease in most cases was found to be root nematodes; *Anguillulina similis* Cobb. and *Heterodera marioni* Cornu. Fungi of the genus Pythium are also intimately concerned with the disease, which is being investigated fully by the Plant Pathologist.

2. Pests of Pineapple

As in the preceding year regular spraying of pineapple plantations with 1 per cent. Diesel oil clay was advocated to planters concerned.

3. Pests of Stored Products

Fumigation of the Government Tobacco Warehouse with Hydrogen cyanide against *Lasioderma serricorne* L. was carried out successfully. The pot method was introduced and this proved more satisfactory than Cyanogas, since the evolution of gas was quicker and more complete, a general concentration of 5 to 7 mg. HCN per litre being attained within a quarter of an hour of starting a fumigation. The incidence of the pest has considerably decreased, though an occasional infested bale is encountered.

4. Pests of Coconut

There has been a great improvement in the coconut plantation of the Island. The Javan coccinellid, *Chilocorus politus*. Muls., is now of widespread occurrence and the great improvement of the plants may be

attributed to this predator. The Ceylon coccinellid, *Chilocorus nigritus* Muls., was also introduced during the year and has already been recovered.

5. Pests of Forest Products

Termites

Experiments with wood preservatives as a means of combating termites were continued as in the preceding year.

6. Pests of Fruits and Minor Crops

Fruit Flies

The Scientific Assistant on his return journey from Ceylon imported the following chalcidoids : *Dirhinus auratus*, and *Spalangia* sp., which are reported to parasitise fruit flies in Ceylon. About 200 Dirhinus were received alive and laboratory breedings were started on local fruit flies. Of the *Spalangia* sp., only 80 individuals were received alive, they were nearly all released.

7. Importation of Parasites and Predators.

The table hereunder summarises the various importations of the beneficial insects carried out during the year. Special stress should be laid on the difficulties encountered during the various investigations. Sometimes the very long delays of shipment in transit reduced the survival of the parasite or predator considerably.

Origin	*Insect imported*	*Number imported*	*Number received alive*	*Remarks*
South Africa	... *Microphthalma capensis* Schin.	4,267	... 4,213	... Parasitised host larvæ imported with 2–5 parasites per white grub.
do.	... *Pexopsis pyrrhaspis* Villen.	5,578	... 1,683	.. Sent as pupæ in adult beetles
do.	... *Adapsilia latipennis* Wlk.	2,462	... 0	... do.
do.	... *Rhodolia cardinalis* Muls.	365	... 6	... Sent as adult and pupæ.
do.	... *Cryptolæmus montrouzieri* Muls.	1,050	... 282	... do.
North Africa	... *Dexiomorpha picta* Meig.	7,729	... 1,331	... Parasitised host larvæ imported with one parasite per white grub ;
do.	*Tiphia morio* F.	2,800	... 0	.. Female wasps imported ; journey too long, insect did not survive.
Ceylon	... *Bracon albolineatus* Cam.	759	... 200	... Imported as pupæ and adult.
do.	... *Xanthopimpla stemmator* Thunb.	58	... 47	... Imported as adult.
do.	... *Dirhinus auratus* Ashm.	1,200	... 200	... Imported as host pupæ
do.	... *Spalangia* sp.	800	... 80	... do.
do.	... *Trichospilus pupivora* Ferr.	21,500 c.a.	...18,000 c.a.	... do.
do.	... *Chilocorus nigritus* Muls.	130	... 111	... Imported as adult.
do.	*Trichogramma evanescens* Westw.	15,000 c.a.	.. 5,000 c.a.	... Imported as egg parasites.
England	.. *Dexia rustica* F.	827	... 40	... Imported as host larvæ.

W. F. Jepson,
Entomologist.

CHEMICAL DIVISION

Investigation Work

1. Tobacco

Considerable attention has been devoted last year to the study of the composition of the smoke produced by cigarettes of different brands and a "ratio" was calculated which has been considered to give an indication of the quality of the tobacco. The full results of these investigations will be published in *La Revue Agricole de l'Ile Maurice*.

2. Analysis of Rice

Rice forms the staple food of the population in the Island, so samples of the different varieties imported were analysed in order to determine their relative chemical composition. The results obtained show that "white rices" are on the whole very poor in minerals, the deficiency in calcium oxide is particularly striking. The iron figure is also very low

3. Chemical Composition of Pastures

(*i*) An investigation on the seasonal chemical composition of pastures was started in the month of May at Palmar Experiment Station under the direct supervision of the Plant Pathologist. Samples were collected every month and chemical determinations performed accordingly. The investigation has not yet been completed.

(*ii*) Six samples of grasses secured from different localities of Rodrigues and from typical pastures were examined :

Locality	*Species*	*Ash* %	*N* %	*CaO* %	P_2O_5 %	K_2O %
Ile Michel ...	*Cynodon dactylon* ...	10·7	1.4	0·62	0·45	2·41
Baie Malgache ...	*Cynodon dactylon* ...	10·9	1.5	0·71	0·96	3·08
Anse Raffin ...	*Dicanthium caricosum* ...	11·4	1.1	0·54	0·43	2·56
Corails ...	*Cymbopogon pruinnosus* ...	—	0.61	0·84	0·57	1·07
Baie Topaze ...	*Botriochloa pertusa* ...	9·1	0.66	0·61	0·50	1·56
Pancia ...	*Panicum maximum* ...	13·1	1.20	0·64	0·56	2·17

On the whole these figures show a great mineral deficiency.

(*iii*) Two samples of *Stenotaphrum* secured at Chagos Islands have given the following results :

	Ash %	*N* %	*CaO* %	P_2O_5 %	K_2O %	*Fe* %
Healthy sample ...	9·8	1·41	1·67	0·55	3·50	0·077
Chlorotic ,, ...	8·8	0·95	1·70	0·50	3·20	0·031

It is interesting to note the rather high content of calcium and potassium respectively.

4. Maize

At the Food Controller's request a series of experiments was performed in order to ascertain the keeping quality of maize ground and screened through a sieve of 1/32 in aperture. Experiments were also carried out on the drying of maize in barns used for the curing of tobacco leaves.

5. Ensilage

Experiments on ensilage were again undertaken at the Government Dairy using a superstructure and a roof made of a tarpaulin especially sewn for this purpose. This new feature has two advantages : (i) to be of a good protection against rain, (ii) to be easily removable.

The following herbage was used :—

		Tons
Panicum maximum (Herbe fataque)	...	5·5
Mixed local grasses	...	5·5
Axonopus compressus (gazon anglais)	...	3·5
Penisetum purpureum (elephant grass)	...	1·0

When given to the cows at the Dairy the silage which has the characteristic good odour was eaten by the cattle. Only a loss of 26·6 per cent. had occurred.

6. Juniper Wood Oil

At the request of the Conservator of Forests a sample of *Juniperus Bedfordiana* was submitted to distillation, the yield in oil was very small 1·3 per cent, and the smell of the product was not pleasant.

7. Soil Survey in the Northern District

So as to cover the area of the northern districts when an irrigation scheme is considered, a soil survey was systematically carried out conjointly with the Sugarcane Research Station chemical division, and a soil map was prepared accordingly and submitted to the irrigation expert.

8. Analysis of Milk from the Government Dairy

The analysis of samples of milk was performed as usual in the months of April, July and November respectively. The average figures given below are quite in keeping with those of the previous year :—

	Fat		*Solids not fat*
Morning milk	3·4%	...	8·06%
Evening milk	4·2%	...	8·13%

9. Routine Work

The routine work during the year under review included the analysis of 326 samples, 821 estimations being carried out.

Education

The usual duties in relation to the teaching of chemistry at the Mauritius College of Agriculture was performed by the Lecturer and Assistant Lecturer. Mr. R. Lincoln has served on the Board of Examiners for the Registration of Agricultural Chemists.

Miscellaneous

Mr. F. Durocher-Yvon, a former student of the College of Agriculture, working in the chemical division, is in charge of all the chemical work in connection with the investigation on pastures.

I wish to make a further acknowledgement of the assistance received from Mr. E. Haddon during the year under review in connection with the investigation on tobacco.

R. Lincoln,
Chemist.

TOBACCO DIVISION

A. TOBACCO RESEARCH STATION

The establishment of this Station, on part of Richelieu Estate, was rendered possible by a grant from the Colonial Development Fund during 1938. Clearing of the land, which has been abandoned for five years and had reverted to scrub, was commenced late in 1938 and is still in progress.

2. Tobacco Research Advisory Committee.

A Committee consisting of the Director of Agriculture, Government Tobacco Officer, Senior Chemist, Chemist and Plant Pathologist, was formed to assist in preparing the programme of research and to consider results. The management of the Station is vested in the Government Tobacco Officer. During the year the Committee held six meetings, three of which took place at the Station.

3. Research Programme

The following research programme was drawn up:

(*a*) Plant Breeding

(1) Introduction of new varieties.
(2) A continuation of selection within varieties which have proved suitable for local conditions.

(*b*) Field Trials

(1) Selected variety trials.
(2) Fertilizer experiments.
(3) Priming trials on different varieties.
(4) Flavour trials.

(*c*) Chemical Investigations

(1) Special selection according to chemical constituents.
(2) Chemical study of cured leaf of different varieties with relationship to smoking quality and flavour.

(*d*) Curing Investigations

(1) Continuation of investigations into different methods of curing
(2) Furnace construction.

4. Climatic Conditions

The season did not open propitiously and further sowing had to be made on account of the cyclone experienced in March. The growing season was not entirely favourable, conditions alternating between cold, windy, wet weather to very dry and sultry conditions; high winds caused damage to all trials. The rainfall amounted to 41·66 inches.

5. Experiments

(*a*) Plant Breeding

(1) Introduction of New Varieties

The varieties Charlie's Special, White Stem Mammoth, Harrison's Special, White Stem Willow Leaf, Little Orinoco, White Stem Pearl, White Stem Orinoco, Yellow Pryor, and Yellow Orinoco, which were introduced from Canada with a view to find a variety or varieties suitable for local conditions and possessing a flavour acceptable on the London market, were planted in three randomised blocks and from the field growths were most promising.

Unfortunately certain leaf got mixed during stripping and grading and, therefore, results are not published.

The leaf from all varieties cured well and it has been packed and will be tested for flavour after maturing for one year.

(2) Selection with Varieties

The first selection was made on field observations and leaf from each selected plant was cured separately. The final selection being made on the cured leaf. Seed therefrom will be utilised for the selection plots and experiments in the coming year.

(*b*) Field Trials

(1) *Selected Variety Trials*

(*a*) The varieties Bonanza, Jamaica Wrapper, Virginia Bright, White Mammoth and Yellow Mammoth tested in three randomised blocks appear to be most suitable for local conditions and are superior in quality and flavour to the Amarello.

It was concluded from this experiment that Jamaica Wrapper is significantly better than Virginia Bright, white Mammoth and Yellow Mammoth, but not significantly different to Bonanza. There is no significant difference between Bonanza, Virginia Bright, White Mammoth and Yellow Mammoth.

The grade index was calculated in order to ascertain the curing properties of the varieties ; no significant difference was obtained between the varieties.

The acreage value of varieties on analysis was found to give significant differences, *viz* :—

Varieties	*Value Rupees per acre*	*% of mean.*
Bonanza	717 ...	103·8
Jamaica Wrapper ..	789 ...	114
Virginia Bright ...	643 ...	93
White Mammoth ...	616 ...	89.2
Yellow Mammoth ...	690 ...	99·9
Mean :		
Significant Difference ...	118 or 17·1 per cent.	

Thus Jamaica Wrapper is significantly better than Virginia Bright and White Mammoth but not significantly better than Bonanza or Yellow Mammoth. There is no significant difference between Bonanza, Yellow Mammoth, Virginia Bright and White Mammoth.

(*b*) The varieties Cash, Gold Leaf and Narrow Leaf Orinoco were given a final trial and planted in three blocks in this experiment. As in the last experiment they appeared unsuitable for local conditions. Whilst they were admirable from a growth point of view they were poor in the curing barn and yields were lower than in the case of other varieties.

(2) Fertiliser Experiment

Object.—To test the effect of varying levels of the three primary manurial ingredients: nitrogen, phosphorus and potash. The effect to be measured as (*a*) total yield of cured leaf, (*b*) grade produced calculated by grade indices and (*c*) value per acre.

Design.—The last cut was a 3 × 3 × 2 factorial experiment with two replications.

Manurial treatments.—The treatments and levels chosen were, in kilos per acre:

	N.	P_2O_5	K_2O
1st level ...	0 ...	0 ...	0
2nd level ...	8 ...	20 ...	24
3rd level ...	16 ...	40 ...	—

The nitrogen was supplied in the form of sulphate of ammonia, phosphorus in the form of superphosphate, and potash in the sulphate form.

Field Observations.—The plots which received no potash were easily distinguishable; the plants being darker in colour and much smaller and of slower growth, they were also the last to arrive at topping stage. The plots receiving nitrogen and phosphate combined and phosphate alone were the first to arrive at topping stage. There was no noticeable difference between the potash and the no-potash plots. The results have been forwarded to Rothamstead for analysis.

Meanwhile the following summarised observations are recorded: Potash had a depressing effect on yields and on value per acre. Phosphorus increased yields slightly when applied alone. It also increased the financial returns particularly when applied in combination with nitrogen. Nitrogen and potash alone or in combination did not increase yields. The most marked feature is the interaction effect between nitrogen and phosphorus, whilst the further addition of potash had no effect. The addition on nitrogen at second level of phosphorus produced marked increases in yield, and still heavier increases in yields were obtained when phosphorus was increased with equivalent amounts of nitrogen. It would appear, however, that the increase in yield and value per acre due to the application of nitrogen or phosphoru is dependent upon the amount of the other ingredient present also.

Value of cured leaf in Rupees per acre at varying levels of nitrogen, phosphorus and potash alone and interacting :—

Level	Kilos per acre		Nitrogen—Rupees per acre		
	Phosphorus	Potash	1st level 0	2nd level 8	3rd level 16
1st	0	0	406	265	478
2nd	20	0	431	626·5	737
3rd	40	0	563	746·5	800·5
1st	0	24	214·5	255	396
2nd	20	24	557·5	675·5	649·5
3rd	40	24	585·5	726·5	614·5

(3) Priming Trials

This trial was planted out towards the end of August, with a two-fold object in view, *viz.* : (1) to test seasonal effect on the varieties, (2) to test the effect on low, high and no priming. Eight varieties were included in the trial and they were planted in three randomised blocks and the three methods of priming were carried out in each block

Unfortunately the cyclone of the 16th December ruined the trial when less than half the leaf had been harvested.

The following points were observed :

(*a*) The growth of the plants was much slower than that observed in plants planted in April or May.

(*b*) Priming had the effect of delaying growth.

(*c*) The unprimed plots suffered most severely from attacks of mildew, *Oidium* sp.

(4) Flavour Trials

This trial was drawn up with the object of testing leaf produced from plants grown from (*a*) originally imported seeds, (*b*) seed of first, second and third generations.

The germination of the original and first generation seed was entirely poor, in some varieties no germination took place, and thus at the outset the trial had to be modified considerably. In no case was it possible to secure the same number of plants of each generation. Also, all varieties were attacked by mildew, *Oidium* sp. Thus the object of the trial was frustrated.

It was, however, noted that there was but little difference in vegetative characteristics between the various generations of each variety which would appear to indicate that selection had not departed from the varietal type.

(c) Chemical Investigations

(1) Selection Experiment

In this experiment approximately ¼ acre was planted with Bonanza. The Chemist, who designed this experiment, after determinating the chemical constituents of a large number of plants, selected three of them. The seed from the selected plants has been sown and further selection will be carried out on the same lines.

(2) Chemical Study of Cured Leaf from Different Varieties with Relationship to Smoking Quality and Flavour

Samples of freshly cured leaf has been submitted for analysis and smoking tests are being carried out at the Government Tobacco Warehouse. The remaining leaf has been baled and further test will be conducted after one year's maturation.

Chemical analysis of leaf from the fertiliser experiment are being carried out from the freshly cured leaf and here again further analysis will be done after one year's maturation in bales.

(d) Curing Investigations

(1) Continuation of investigations into different methods of curing

It has not been possible to continue the experiments designed to test the effect of acetylene gas owing to unavoidable delay in the erection of experimental barns.

Samples from last year's experiments were forwarded to the Imperial Institute and to Brokers in London for report.

The Brokers stated in their report that "while the colour of the tobacco is very good, the bulk of the tobaccos appear to be slightly bitter and hot," also, that "these tobaccos are all lacking in character and are very mild."

(2) Furnace Construction

A "Gundry Tobacco Furnace" which has just been constructed and which appears to be far more economical in fuel and also provides better control over the temperature will be tested during the next season against the normal type furnace.

6. Rotation Crops

The station is being laid out for three years rotation work and a rotation programme drawn up. The crops utilised in the rotation are those suitable for the small planters., *viz.*:

Maize	...	*Zea mays*
Pulse	...	*Phascolus radiatus*
Soya beans	...	*Glycine hispida ;*
Sweet potatoes	...	*Ipomea batatas*
Derris	...	*Derris elliptica*, Benth.
Lentils	...	*Lens esculenta*

Spacing experiments have been designed for all these and the first series of crops were sown or planted during December.

7. Windbreaks

The open situation of the station has rendered the planting of windbreaks imperative and these are being planted in the following species of trees: *Eucalyptus giganta, Casuarina equisitifolia, Cassia florida, Cedrella toona* and *Terminalia arjuna.*

8. Irrigation

The crops are grown under irrigation and an irrigation reservoir has been constructed for the storage of irrigation water.

9. Staff

During the year Mr. P. Couve, DIP. AGRIC. (*Mauritius*), was engaged as Scientific Assistant and took up his duties on 15th April.

B. TOBACCO STATION LA FERME

This station is now being utilised as a seed supply station, and each year plants from selected strains will be planted for bulk distribution of seed to planters. This has been found necessary owing to the faulty seed selection practised on the majority of estates and which has resulted in the gradual deterioration of the variety.

During the year reviewed strains of approved varieties were planted and seed of both flue curing and air curing varieties is now available for distribution.

Even though, it is primarily for seed production leaf is cured and during the past year 1,288 kilos of leaf were delivered to the warehouse and the sum of Rs. 1,302.32 obtained.

GEOFFREY CORBETT,
Government Tobacco Officer.

VETERINARY DIVISION

HEAD I

A. Disease Control

(1) FIELD OPERATIONS

One thousand nine hundred and four centres were inspected during the year as against 1,774 in 1938.

TRYPANOSOMIASIS.

The number of blood smears taken and examined during the year was as follows : Bovine 15,920, Equine 626, Goats (control at Quarantine Station) 32.

Eight positive cases were recorded as compared with thirty-eight in 1938 and sixty-five in 1937. Of these eight infected animals, one was suffering from *T. vivax*, viz., a draught bullock which was treated and cured. The seven other animals showed *T. Evansi* : five bovines and two horses. The bovines were treated and cured, while of the two horses, one was destroyed by its owner and the other died before treatment could be started.

Tuberculosis

The campaign against tuberculosis has been intensified and systimatised during the second half of the year. All herds will henceforth be wholly treated.

Three hundred and forty-eight animals in herds were treated with concentrated tuberculine with 40 positive reactions, as against 181 animals tested with 19 positive reactions in 1938.

The preparation of the B.C.G. vaccine by the Bacteriological Laboratory was resumed during the year and 186 doses were issued to breeders during the months of June, July and August. The cultures were then found to grow abnormally and the preparation of vaccine was stopped. A fresh strain was imported from Madagascar but failed to grow and at the close of the year the desirability of sending an officer of the Bacteriological Laboratory to Madagascar to fetch a further strain was under consideration.

Piroplasmosis

Two cases occurred in the herd of bovines and immediate measures of control were taken which prevented the spreading of the disease.

(2) Research Operations

Contagious Abortion of Cows

The number of cases of abortion in the herd of the Government Dairy rose during the year to twenty-four as against seven in 1938. After numerous unsuccessful attempts, several fœtuses were finally obtained in sufficiently fresh condition to be subjected to examination by the Bacteriological Laboratory officers. A streptococcus was detected and a vaccine prepared for application under the Besredka's method. Applications could however be started late in December.

B. Animal Husbandry

(1) Field Operations

The seventeen purchased bulls of the Africander and Charolais breeds imported in 1938 for breeders have been maintained in good health condition throughout the year. At the end of the year 596 services had been recorded and 193 calves of the first cross progeny had been born. The large majority of these calves show a stronger build than the local calves.

At the Government breeding centre at Palmar the pure bred Charolais bull and his cows, imported in 1938, suffered from sudden illness during the year and the two cows died; the bull, however, recovered. Symptoms were those of poisoning but analysis did not reveal the presence of any known poison.

(2) Research Operations

At the Palmar breeding centre, experiments are in progress, the objects of which are (*a*) to determine whether pure bred Africander and

Charolais animals will thrive under conditions obtaining in breeding centres in Mauritius, (*b*) to produce pure bred locally born bulls of these breeds for the benefit of local breeders, (*c*) to rear under standard management the cross-bred progeny of these two imported breeds and determine their economic value as beef animals, (*d*) to investigate the possibilities of establishing through selection a strain of local breed of bovines possessing the character of beef animals, (*e*) to investigate various points in connection with the experimental cultivation of fodder grasses and pasturage.

C. Improvement of Marketing of Animals and Animal Products

The Veterinary Officer visited the slaughter houses of the colony on sixty-eight different occasions. Five carcases were seized, of which three were destroyed for tuberculosis and the others for illegal slaughtering.

The number of cows and heifers of the milch breed considered unfit for reproduction which have been authorised to be slaughtered during the year was 94 as against 120 last year.

D. Veterinary Education

To first and third year students of the Agricultural College, lectures were delivered during the year in Anatomy, Physiology, Pathology and Animal Husbandry.

HEAD II

(a) Quarantine

REDUIT GOVERNMENT KENNELS

During the year, three imported animals were subjected to a six months quarantine at the Réduit kennels, viz. : one dog, one bitch and one cat.

YVES LEFEBURE,
Acting Veterinary Officer.

GOVERNMENT DAIRY

Yield of Milk

The production of milk showed an increase of 32,040 litres on the previous year, namely 118,422 litres in 1939 as against 86,382 litres in 1938. The milk was distributed as follows :

	1939	*1938*
Supplied to Hospitals ...	39,557 ...	12,402
Supplied to public ...	74,080 ...	69,917
Fed to calves ...	4,410 ...	3,645
Samples for control ...	375 ...	418

Births

Thirty-two calves were born during the year : 16 males and 16 females (one of which was still-born). Corresponding figures in 1938 were 31 births, 14 males and 17 females.

Deaths

One adult female died from peritonitis and one calf from umbilical hernia.

Sales

Nineteen calves were sold to breeders and cowkeepers : 15 males and 4 females. Seven cows were discarded for old age, sterility or blind teats and sold to the butcher. The senior bull of the establishment, having been replaced by a young imported bull, was sold to a private dairy enterprise.

Abortion

Twenty-four cases of abortion were recorded during the year as against seven last year. Of these twenty-four cases, five occurred in advanced pregnancy and the calves were born alive but so weak that they died shortly after birth. Aborted fœtuses were examined at the Bacteriological Laboratory and the causative organism was found to be a streptococcus, as in previous years. The usual vaccine was prepared and application was started in December, the whole herd of females being treated.

Health Conditions

Blood examinations were carried out throughout the year with negative results, while the number of cases of retention of placenta on normal calvings was six as against eight the year before.

General Remarks

Twenty milch cows of the local breed were added to the dairy herd in March and one bull and four cows of pure Friesland blood were received from South Africa and admitted at the dairy after a two months period of quarantine at Fort William. All data relative to the amount of milk produced by these cows, the rate of development of their calves on hand rearing, etc., are faithfully recorded and will, in course of time serve the purpose of establishing the economic value of the local milch cows as well as that of their progeny from pure bred Friesland sires.

YVES LEFEBURE,

Officer in charge.

RODRIGUES

Climatic Conditions

Weather conditions, which had been unsatisfactory in January, improved in February and continued to be favourable until October, Rainfall was evenly distributed for the greater part of the year, the total recorded at four stations being: Oyster Bay 40·01, Solitude 41·52. La Ferme 38·14 and Mont Lubin 48·99 inches.

Agricultural Conditions

Generally speaking, satisfactory crops of foodstuffs were obtained during the year. Maize, sweet potatoes, manioc and beans yielded well, and the effects of diseases and pests were not important, except in one or two localities where sweet potatoes and tobacco were severely attacked by insects. Maize kept for seed was almost entirely spoilt by weevils, and seeds had to be imported from Mauritius. With regard to tobacco, a production quota of 34 tons was allowed to Rodrigues for 1939. One hundred and eighty-nine permits to planters were delivered. Owing to insects attacks, plantations started very late and further suffered from the usual dry periods towards the end of the year. Yields were poor and exports fell to 260 bales as compared with 716 bales for the previous year.

Variety Experiments.—The following varieties of food crops gave the best results: Maize, "South African Red"; Sweet Potatoes, "Joes and Pierson"; Yams "Light Red."

Of the several varieties of beans grown Webb's "Hundred Fold" was found to be superior.

Plant Propagation.—A solar propagator was erected and proved exceedingly valuable for the raising of bread fruit plants of which 450 were produced.

Numerous seedlings of coffee, mango, citrus, latania, coconuts and ornamental plants were also raised, together with 50,000 filao seedlings for the Forest Department.

Much time was devoted to grafting work and two labourers were specially trained for the purpose.

Miscellaneous.—Buildings, roads and drains were kept in good condition. The Overseer's house was repaired.

2,593 Vanilla pods were obtained at Mont Lubin, and 2,529 at Solitude. The 1938 crop was shipped to Mauritius.

Erosion Control

In this connection, the work has proceeded on the same lines as previously. Gangs were changed every week in order to give an opportunity to a greater number of persons of becoming acquainted with the various methods of control.

Pasturage

The improvement of pastures continued to receive attention. Small areas of Rhodes grass and Kikuyu were laid down at Baie du Nord, whilst at Baie Topaze casuarina, acacia, and fatac were planted. Various other exotic species were sown in the nursery.

2. The provision and accessibility of water for cattle is an essential part of any programme of improvement. During the year, three new water troughs were built on strategic sites.

Coconut Plantations

Four hundred and ninety-two seedlings were planted in areas specially fenced for that purpose.

Latania Plantations

5,265 plants of two species, *Latania Verschaffeltii* and *Latania Loddigessii* were planted at Oyster Bay, covering an area of 12 acres.

Plant Pests and Diseases

The major disease of the year was Citrus Canker which was found in the whole of the western area of the island. In view of the ease with which citrus grows in the Dependency, a vigorous anti-canker campaign was initiated as soon as the disease was detected. Although the campaign only began in July, 11,943 affected plants had been destroyed by the end of December. Surveys of the infected areas were made every fortnight and any diseased plant was burnt at once.

Staff Movements

On the 4th October the Agricultural Superintendent left for Mauritius on sick leave and the Overseer took charge of the Station. Foreman A. Rousetty resigned. Ignace Perrine was appointed, on six months' probation, to fill the vacancy.

J. H. JULIEN,
Overseer.

PART III

Legislation

The following Ordinances, Proclamations, and Government Notices were issued during the year :

Government Notice No. 2 of 1939. Regulations made by the Governor in Executive Council under sub-paragraph (1) of paragraph 1 of Article 16 of the Animal Diseases (Consolidation) Ordinance, 1925, as repealed and replaced by Article 2 of the Animal Diseases (Amendment) Ordinance, 1930.

Proclamation No. 2 of 1939. To remit stamp duties and registration fees chargeable on instruments executed by or on behalf of "The Union Park Co-operative Credit Society."

Proclamation No. 3 of 1939. To remit stamp duties and registration fees chargeable on instruments executed by or on behalf of "The Camp Thorel Co-operative Credit Society."

Proclamation No. 7 of 1939. To remit stamp duties and registration fees chargeable on instruments executed by or on behalf of "The Congomah Co-operative Credit Society."

Proclamation No. 8 of 1939. To remit stamp duties and registration fees chargeable on instruments executed by or on behalf of "The Mare d'Albert Co-operative Credit Society."

Ordinance No. 22 of 1939. To control the planting of "Uba de Riche Fond varieties of Sugar Cane."

Proclamation No. 21 of 1939. To control the disease of Citrus Plants in Rodrigues.

Proclamation No. 22 of 1939. To remit stamp duties and registration fees chargeable on instruments executed by or on behalf of "The Laventure Co-operative Credit Society."

Ordinance No. 27 of 1939. To provide for the sale and purchase of canes.

Ordinance No. 61 of 1939. Further to amend the Sugar Export Duty Ordinance, 1922.

Proclamation No. 42 of 1939. To remit stamp duties and registration fees chargeable on instruments executed by or on behalf of the "Belvédère Co-operative Credit Society."

27/2/41—450+65.